

Dunwoody Labs is an innovator of testing solutions that assist in the diagnosis and management of conditions.

PATIENT INFO

NAME:
 REQUISITION ID:
 DOB:
 SAMPLE DATE:
 RECEIVE DATE:
 REPORT DATE:

CLINIC INFO

DHA Laboratory
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ADVANCED INTESTINAL BARRIER ASSESSMENT: PROFILE 5150 (PLASMA) | 1/2

5.10

REPORTABLE RANGE: 0.0-5.2 ng/ml

BORDERLINE HIGH

Zonulin



82.80

REPORTABLE RANGE: 33.9-134.5 ng/mL

NORMAL

Diamine Oxidase (DAO)



2.00

REPORTABLE RANGE: 0.0-2.0 ng/mL

HIGH

Histamine



41.40

REPORTABLE RANGE: 17.8-9980.0

NORMAL

DAO: Histamine Ratio



A high DAO-to-Histamine ratio suggests that there is sufficient DAO present to degrade any free histamine. Conversely, a low DAO:Histamine ratio may be more indicative of histamine intolerance.

ADVANCED INTESTINAL BARRIER ASSESSMENT: PROFILE 5150 (PLASMA) | 2/2

19.44

REPORTABLE RANGE: 0.0-47.3 ng/mL

BORDERLINE HIGH

LPS IgA



29.54

REPORTABLE RANGE: 5.0-117.9 ng/mL

LOW

LPS IgG



7.65

REPORTABLE RANGE: 1.1-36.1 ng/mL

BORDERLINE LOW

LPS IgM



This test was developed and its performance characteristics determined by Dunwoody Labs or third-party reference affiliates. FDA clearance is not currently required for clinical use. Results are not intended to be used as the sole means for clinical diagnosis. Clinical correlation is required.

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Imbalances in Zonulin, histamine, DAO and LPS are associated with intestinal permeability, often referred to as, "leaky gut."

When the gut barrier is weakened, a person is more vulnerable to food antigens, toxins, and unfriendly microbes. A leaky gut tears down the body's defenses and opens up the system to increased inflammation.

There are many possible causes of damage to the GI lining and subsequent leaky gut.

Common causes of intestinal permeability are bacterial overgrowth, food sensitivities including gluten sensitivity, NSAIDs, and alcohol consumption.

Reducing inflammation and healing the GI lining can help restore the GI barrier and normalize Zonulin, DAO, histamine, and LPS.

High Zonulin

High plasma zonulin is associated with intestinal permeability. Zonulin is a protein that leads to the breakdown of tight gap junctions in the GI lining. These junctions are critical for a healthy barrier against the outside world.

When the gut barrier is weakened, a person is more vulnerable to food antigens, toxins, and unfriendly microbes. A leaky gut tears down the body's defenses and opens up the system to increased inflammation.

Increased levels of zonulin may be a contributing factor in the development of celiac disease, autoimmune disorders, insulin dependent diabetes, multiple sclerosis and rheumatoid arthritis. Higher zonulin levels have been reported in patients with active celiac disease compared to non-celiac patients.

¹⁻³Zonulin levels elevate 2-5 years before diabetes, autoimmune conditions, and allergies. Zonulin may therefore be an early marker of disease processes.

Histamine Intolerance

Histamine intolerance can develop when a person has abnormal levels of histamine and the histamine-degrading enzyme, diamine oxidase (DAO). Typical symptoms of histamine intolerance are headache, diarrhea, migraine, and engorged or dripping nose.

Histamine intolerance might be more obvious with specific food triggers leading to asthma and arrhythmia, hypotension, urticaria, and dysmenorrhea. When DAO or histamine is imbalanced, the main focus of treatment is to increase DAO, reduce histamine, and heal the gut.

High Histamine

- Anaphylaxis
- Gas
- Low muscle tone
- Painful menstruation
- Circadian rhythm
- High blood pressure
- Shortness of breath
- Body temperature
- Dizziness
- Congestion
- Runny nose
- Food intake
- Nausea, vomiting
- Food intake
- Hives
- Memory
- Diarrhea
- Flush
- Locomotion
- Stomach Ache
- Itching
- Cramps
- Abnormal heart rate
- Headache
- Sneezing

Histamine

Histamine balance is a critical factor in patients with allergic and gastrointestinal symptoms. Histamine was first discovered for its role in anaphylactic allergy. A specific allergen can trigger the degranulation of mast cells, subsequently releasing histamine. This can lead to severe, life-threatening symptoms. When the gut barrier is weakened, a person is more vulnerable to food antigens, toxins, and unfriendly microbes. A leaky gut tears down the body's defenses and opens up the system to increased inflammation.

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Classic symptoms of high histamine are tachycardia, headache, flushing, urticaria, pruritis, hypotension, bronchospasm, and cardiac arrest. However histamine can have far-reaching impacts and lead to many atypical symptoms because it binds cells throughout the body- in the gastrointestinal tract, respiratory tract, skin, cardiovascular system, and central nervous system, among others.

Gut permeability can also increase histamine. Leaky gut activates T cells and triggers degranulation of histamine-containing mast cells. In addition to histamine made in the body, we consume histamine in varying amounts in foods. An excellent full text review of this topic is available.¹

After extreme histamine exposure, like in anaphylactic shock, levels of both diamine oxidase and histamine will be elevated. Low histamine levels may cause fatigue or depression. Alterations of histamine have been noted in sleep-wake disorders such as narcolepsy, as well as other neurological and psychiatric diseases. Brain levels of histamine are decreased in Alzheimer's and low histamine has been seen in cases of convulsions and seizures.

High Histamine Foods

Very High: Aged or fermented foods: kimchi, sauerkraut, yogurt or kefir, kombucha, aged cheese, alcohol of any kind, vinegar, and cured meat. Fish and seafood, especially canned or smoked fish.

Medium: Spinach, eggplant, mushrooms, tomatoes, canned vegetables, dried fruit, avocados, strawberries, papaya, pineapple, and leftovers.

DAO

Diamine oxidase (DAO) is histamine's vital counterpart and the primary enzyme responsible for keeping histamine levels in check. DAO degrades extracellular histamine and is mainly produced in the microvilli of the small intestine. When diamine oxidase is low it means the patient cannot properly break down histamine. Histamine-N-methyltransferase (HNMT) is the secondary enzyme involved in histamine break down.

Low diamine oxidase is associated with headaches, fatigue, hives, any allergy symptom, dysmenorrhea, estrogen dominance, arrhythmia, inflammation, arthritis, and certain neurologic conditions such as multiple sclerosis. Symptoms of low DAO are essentially identical to symptoms of histamine excess because they are two sides of the same coin.

Low levels of DAO correlate with poor mucosal integrity and indicate poor gut function. Atrophy of the microvilli can cause low DAO. Patients suffering from diseases like urticaria, Crohn's, or celiac disease are reported to show low DAO activity in serum or plasma.^{4,5} Low DAO can also be a trigger for depression or anxiety. Low diamine oxidase in plasma can be used to diagnose histamine intolerance. Individuals with an inability to break down histamine may seem to "react to everything," or improve on anti-histamines. Those with anaphylactic reactions often have lower DAO activity. Following a histamine-free diet can result in a significant reduction, or even disappearance, of symptoms within a few weeks.

Many medications inhibit DAO or damage the gut lining, reducing DAO production. Alcohol and its degradation product, acetaldehyde, are inhibitors of DAO.

DAO: Histamine Ratio

The DAO:Histamine Ratio helps detect subtle imbalances between histamine and DAO levels. Even if the DAO enzyme level is normal, symptoms can occur when histamine is high. A low ratio indicates that there may not be enough of the DAO enzyme relative to the amount of histamine in your body.

Treatments to normalize DAO or histamine will also improve this ratio.